

REMARKS

This Amendment is submitted in response to the non-final Office Action of January 30, 2006 (hereinafter “the Office Action”). Upon entry of this Amendment, claims 1-3, and 20-25 will be pending in this Application.

All references to the claims, except as noted, will be made with reference to the claim list above beginning on page 2. Unless the source document contains line numbers (e.g., issued U.S. patents) all citations herein containing line numbers will count every printed line, except the page header, but including section headings. References to “the Application” will be made to the substitute specification submitted November 17, 2003. If there is any confusion or questions regarding any aspect of this Amendment, the Examiner is invited to contact the undersigned.

Status of claims

Claims 1-3 and 19 stand rejected under 35 U.S.C. § 102(b) and claims 20 and 21 stand rejected under 35 U.S.C. § 103(a) based on newly-cited art. Applicants note with appreciation the withdrawal of previous objections and rejections under 35 U.S.C. §§ 112, 102, and 103.

Examiner Interview

Applicants acknowledge with great appreciation the courtesy extended to the undersigned of granting the Examiner interview of April 6, 2006. Although no agreement was explicitly reached in the interview, the changes to the independent claims made by this Amendment were suggested to the undersigned as likely to overcome the prior art of record. The Examiner also indicated that, should any additional minor changes be necessary, she would call the undersigned and inform him of such changes. Applicants appreciate the assistance provided by the Examiner in overcoming the prior art of record.

Amendment

Claim 1 is amended so that the phrase, “said backing register file . . . in at least one mode, is . . . available to the programs at any privilege level such that each of the plurality of registers is accessible at random using a uniquely assigned address” now reads as, “said backing register file . . . in at least one mode, . . . is directly accessible to instructions in the programs at any privilege level” (claim 1, lines 9-13). Independent claim 22 is amended in a similar manner. This amendment, proposed by the Examiner in the Examiner interview of

April 6, 2006, is intended to emphasize that the backing register file is directly accessible to instructions, thereby better distinguishing the invention from a memory cache. Claim 3 is amended to include additional functional limitations relating to the connection between the register file. New claims 26 and 27 depend from claims 1 and 22, respectively, and further add that the plurality of registers is accessible at random using a uniquely assigned address.

Claim Rejections – 35 U.S.C. § 102(b)

Claims 1-3, 22, and 23 stand rejected under 35 U.S.C. § 103(a) for being unpatentable by U.S. Patent 5,375,216 to Moyer et al. (Moyer) in view of an InstantWeb article describing registers in general. Applicants respectfully traverse because the prior art does not teach each and every limitation set forth in the claim, and further, because the prior art lacks sufficient motivation to combine and/or modify the reference as proposed in the Office Action.

1. Not all limitations addressed

Applicant does not claim to have invented the register per se, as disclosed by InstantWeb. Claim 1 does not set forth, simply, a register, as presented by InstantWeb. Claim 1 additionally requires that the backing register file is “inaccessible to the at least one execution unit and, in at least one mode, is always visible outside the processor and is directly accessible to instructions in the programs at any privilege level” (claim 1, lines 9-12). Moyer does not teach a backing register file as claimed or any analog thereof. Rather, Moyer teaches a memory cache. Memory caches are not directly accessible to instructions and only reflect data retrieved from or to be stored in main memory. InstantWeb teaches a register file, but not one that is inaccessible to the execution units as claimed. Thus, the register file taught by InstantWeb does not depart from typical register files which are accessible to the execution units.

2. No motivation to substitute data cache with register file

Data caches and register files serve distinct purposes. A data cache is accessible to software for temporarily storing operands and results. These operands and results may be intermediate values that are never stored in the main storage area. A data cache is managed by the hardware, and serves as a temporary area to maintain a copy of data retrieved from the main memory, or to be stored to the main memory. Data caches significantly improves memory access times by maintaining a readily available copy of main-memory data close to the processor, in case it is accessed a second time.

While register files are very fast, they could not serve the purpose of a data cache faster than a data cache could. First, data caches are typically much larger than register files. Second, using a register file as a data cache would require significant processor time to manage it, which would slow the system down significantly. Thus, while the Office Action states, “A person of ordinary skill in the art at the time the invention was made . . . would have recognized that a register [is] faster and typically can read two register and write to a register all in a single cycle . . . thereby increasing the speed of the processor (Office Action, sentence bridging pages 3 and 4), the person of ordinary skill would also have recognized that data caches are essential to improve access speeds to the main memory, and could not simply be replaced with a similar-sized register file. Hence, there was no motivation at the time the invention was made to make the proposed substitution as suggested by the Office Action.

Claims 20, 21, 24, and 25 stand rejected under 35 U.S.C. § 103(a) for being unpatentable over Moyer in view of InstantWeb and further in view of a Wikipedia article relating to register windowing. Applicant respectfully traverses because the prior art fails to teach each and every limitation set forth in the claims, and further, because the prior art lacked motivation to combine and/or modify the references as proposed.

1. The prior art does not teach each and every limitation.

Claims 20, 21, 24, and 25 relate to using a backing register file as a register window emulator. Applicants recognize that register windowing *per se* was known, however the invention does not simply add a windowing register file to an existing processor; it instead sets forth a backing register file having a windowing mode in which it “mimics register windowing functionality” (claim 20, lines 2-3). The mere presence of windowing registers in the prior art is not sufficient motivation to provide a backing register file with a windowing mode to mimic windowing functionality.

2. The prior art lacked motivation to combine and/or modify the references as proposed.

The Office Action states, “a person of ordinary skill in the art at the time the invention was made would have recognized that register windowing . . . reduces the amount of time necessary to save data to memory when a procedure call is present . . . thereby improving performance” (sentence bridging pages 5 and 6 of the Office Action). Applicants agree that register windowing can improve performance of a computing system, that the memory cache of Moyer can improve performance of a computing system, and it was known that improved


performance is desirable. However, Applicants do not see any motivation in the prior art for making the data cache of Moyer *mimic* register windowing functionality as set forth in claim 20 as it relates to the disclosed backing register file. The Office may not rely on references that teach that the various aspects of the claimed invention were individually known in the art to establish a prima facie case of obviousness without some objective reason to combine the teachings. The prior art shows that it may have been obvious to provide a processor with both register windowing capability and a data cache, but there is no suggestion or teaching to modify the data cache so that it mimics register windowing as set forth in claim 20.

Since there was no motivation to modify the prior art references as proposed in the Office Action, and because there was no reasonable expectation of success to make the combination as proposed, Applicants respectfully submit that claims 20 and 24 are patentable under 35 U.S.C. § 103(a). Applicant therefore respectfully submits that claims 20 and 24 are allowable under 35 U.S.C. § 103(a). Furthermore, since claim 21 depends from claim 20 Applicants submit that claim 21 is allowable for at least the same reasons as claim 20.

For the reasons listed above, Applicants respectfully submit that this application is now in condition for allowance and earnestly request the same. Should any issue remain outstanding, Applicants invite the Examiner to contact the undersigned so that any remaining issues can be quickly resolved. Likewise, if the Examiner has any questions or concerns regarding the present Amendment, the Examiner is invited to contact the undersigned at (408) 774-6933.

If any fees are due in connection with filing this amendment, the Commissioner is also authorized to charge Deposit Account No. 50-0805 (Order No. SUNMP298). A duplicate copy of the transmittal is enclosed for this purpose.

Respectfully submitted,
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